AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

Cancel claims 1-27.

28. (New) An apparatus for controlling blood flow in an extracorporeal blood circuit, said extracorporeal blood circuit having at least one blood treatment unit, at least one access branch extending between an area where blood is collected from a patient and the at least one blood treatment unit, at least one peristaltic pump associated for operation with said access branch of the extracorporeal blood circuit, and at least one return branch extending between the at least one blood treatment unit and an area where the blood is returned to the patient, said equipment comprising:

at least a first sensor, configured to measure an arterial pressure in a portion of said at least one access branch upstream of the at least one peristaltic pump and to generate a corresponding first output signal proportional to said arterial pressure;

at least a second sensor, configured to measure an angular velocity of the at least one peristaltic pump and to generate a corresponding second output signal proportional to the angular velocity of said at least one peristaltic pump;

a memory designed to store at least one set flow value of a desired blood flow through said access branch, and a calibration function in accordance with at least the following variables:

v1, related to the angular velocity of the pump,

v2, related to the arterial pressure in the portion of said at least one access branch upstream of the at least one peristaltic pump,

v3, related to an actual flow of blood through said at least one access branch;

at least one control unit, operatively coupled to said first and second sensors and to said memory, for receiving said first and second output signals and for storing corresponding measured values of arterial pressure and angular velocity in said memory, said control unit being capable of executing a control procedure comprising the following operations:

calculating an actual flow value by applying said calibration function to the corresponding measured values of arterial pressure and angular velocity measured with said first and second sensors;

comparing said actual flow value with said at least one set flow value;

varying the angular velocity of said at least one peristaltic pump if the difference between the actual flow and the desired flow lies outside a predetermined range.

29. (New) An apparatus according to claim 28, comprising a timer device operatively coupled to the control unit, said control unit being capable of executing said control procedure at predetermined time intervals.

30. (New) An apparatus according to claim 28, comprising a user interface device capable of sending to the control unit at least one signal for activating said control procedure and at least one signal for disabling said control procedure.

31. (New) An apparatus according to claim 30, wherein said user interface device is capable of receiving a manual setting of the set flow and of transmitting said manual setting to said control unit.

32. (New) An apparatus according to claim 31, wherein said control unit is capable of selectively operating, either in a first operating mode, wherein said control unit executes said control procedure in response to at least one said activating signal or said manual setting of the set flow, or in a second operating mode, wherein said control unit automatically executes said control procedure.

33. (New) An apparatus according to claim 28, wherein said control procedure further comprises a step of verifying a stability of said arterial pressure.

34. (New) An apparatus according to claim 33, wherein the step of verifying a stability of said arterial pressure further comprises the steps of:

measuring a first arterial pressure at a predetermined time,

measuring a second arterial pressure after said predetermined time,

comparing a difference between the first and second arterial pressures with a predetermined range of acceptability, waiting for a predetermined time interval and repeating said steps of measuring and said step of comparing, and continuing said control procedure if the difference between the first and second arterial pressures lies within said predetermined range of acceptability.

35. (New) An apparatus according to claim 33, wherein said step of verifying a stability of the arterial pressure is executed before said step of calculating an actual flow.

36. (New) An apparatus according to claim 28, wherein said step of calculating an actual flow value occurs prior to the step of comparing said actual flow value with said set flow value, said step of comparing said actual flow value with said set flow value occurring prior to the step of varying the angular velocity of said at least one peristaltic pump.

37. (New) An apparatus according to claim 36, wherein, after said step of comparing said actual flow value with said set flow value, and before said step of varying the angular velocity of said at least one peristaltic pump, said control procedure including a step of comparing the arterial pressure with a threshold value considered critical for a patient being treated, and, if the arterial pressure is below the threshold value, an exit is made from an algorithm and an operator is alerted by means of a warning message relating to an occurrence of a limit pressure condition.

38. (New) An apparatus according to claim 36, wherein said control procedure further comprises a step of comparing the angular velocity with an acceptable maximum angular velocity value which can be imparted to the pump, after said step of comparing said actual flow value with said set flow value, and before said step of varying the angular velocity of said peristaltic pump..

39. (New) An apparatus according to claim 28, wherein the calibration function is further based upon:

V4, related to a time elapsed from a start condition of said control procedure,

said control unit being configured to determine a time elapsed between said start condition and each instant in which said control procedure is executed, and of calculating an actual flow value by applying said calibration function to a value of said time elapsed and to the corresponding measured values of arterial pressure and angular velocity measured by means of at least said first and second sensors.

40. (New) An apparatus according to claim 28, wherein

$$v3 = \left[\sum_{i=0...n} a_i \bullet (v2)^{n-i} \bullet (v1)^i\right] + C,$$

where a_i and C are experimentally determined known parameters.

41. (New) An apparatus according to claim 39, wherein

$$v3 = \left[\sum_{i=0...n} \sum_{k=0...m} a_i \bullet b_k \bullet (v2)^{n-i-k} \bullet)(v1)^i \bullet (v4)^k\right] + C,$$

where a_i, b_k and C are experimentally determined known parameters.

42. (New) An apparatus according to claim 40, wherein

$$v3 = a \bullet v1 + b \bullet v1 \bullet v2 + c \bullet v2 + d,$$

where a, b, c, and d are experimentally determined known parameters.

43. (New) An apparatus according to claim 41, wherein

$$v3 = (a \bullet v1 + b \bullet v1 \bullet v2 + c \bullet v2 + d) \bullet f(v4),$$

where a, b, c, and d are experimentally determined known parameters and f(v4) is a function which is also known and experimentally determined in a variable v4.

44. (New) An apparatus according to claim 28, wherein said memory is designed to store a plurality of calibration functions, each based upon at least variables

v1, v2, and v3, and each applicable to a corresponding one of a plurality of types of extracorporeal circuits.

45. (New) An apparatus according to claim 44, wherein each of said calibration functions is also a function of a variable v4, related to a time elapsed from a start condition of said control procedure.

46. (New) An apparatus according to claim 45, wherein each of said calibration functions is further a function of:

- v5, related to geometrical characteristics of an access member connectable for operation to said extracorporeal blood circuit; and
- v6, related to a length of a portion of a tube of the at least one access branch upstream of said at least one peristaltic pump.

47. (New) An apparatus according to claim 46, wherein said calibration function comprises two functions linked together with continuity, the first function being valid in a first range of values of arterial pressure, and the second function being valid in a second range of values of arterial pressure following said first range.

48. (New) A software program comprising instructions for making the control unit capable of executing the steps of the control procedure as claimed in claim 28.

49. (New) A program according to claim 48, stored on a magnetic recording medium, an optical recording medium, or both.

50. (New) A program according to claim 48, stored in a computer readable memory.

51. (New) A program according to claim 48, carried by an electric or electromagnetic carrier.

52. (New) A program according to claim 48, wherein said program is stored in a read only memory.

53. (New) A machine for treating blood in an extracorporeal blood circuit, comprising an apparatus for controlling blood flow according to claim 28.

54. (New) A machine according to claim 53, wherein said machine is configured to carry out one or more of the following treatments: hemodialysis, hemofiltration, hemodiafiltration, pure ultrafiltration, or plasmapheresis.